



November 7, 2003

Mr. Malcolm T. Kerley, P.E.
Chief Engineer for Program Development
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219

Re: Supplemental Information for I-81 PPTA Advisory Panel

Dear Mr. Kerley,

The STAR Solutions team is pleased to submit this document in response to your letter dated October 16, 2003, in which the I-81 Advisory Panel requested additional information as a result of our presentation on October 2, 2003. Throughout this process, our focus and dedication to both VDOT and the I-81 project remains constant. We have the resources to immediately start work on this significant project and look forward to that opportunity.

If you have any questions regarding this submittal, please do not hesitate to call me at (804) 340-0205.

Very truly yours,

James W. Atwell
STAR Solutions Team Member



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A. Rail Issues

1. Provide the underlying analysis for, and expected results from, your proposed rail investment.

The STAR Solutions team relied on previous analysis of the rail situation in the I-81 corridor and conversations with Norfolk Southern (NS) when determining our rail plan. In addition, the team has also had conversations with representatives of CSX about truck competitive rail service between the southeast and northeast United States but most of the improvements to realize this goal need to occur outside of Virginia and thus are not included in our rail plan since they are not within the Commonwealth's purview.

STAR Solutions' team member Wilbur Smith Associates (WSA) prepared the *SJR-55 Study* (January 2001) for the Virginia Department of Rail and Public Transportation in which I-81 traffic volumes, improvements and potential truck-to-rail diversions were examined. In that study, WSA identified that the total size of the potentially divertible truck traffic (dry van trailers with trip lengths greater than 500 miles) ranged from 1.96 to 3.00 million for various segments of I-81 for the base year (1996-1998 depending on data source), and forecast between 3.59 and 4.48 million for 2020. It was concluded that only 10 percent of these volumes could be diverted to rail with "truck competitive" service. The estimated cost of track improvements to accomplish this level of diversion was \$2.3 billion, and the study concluded that such improvements do not preclude the need for widening of I-81.

Subsequently, a new study of truck-to-rail potential began in late 2002 and is still underway. Discussions with NS early in that process provided cost estimates for capacity improvements in Virginia to handle extra trains, both freight and passenger (VRE), as well as estimates of the numbers of trains required to handle a range of intermodal units (140,000 to 1,400,000 annually). Cost estimates were provided by NS for three alternatives:

- a "pilot project" that would provide additional capacity for up to 3-4 trains per day in each direction
- a full double-tracking project north and west of Manassas
- a third alternative with improvements falling between the first two and making allowances for expanded VRE service over a portion of the Manassas-Riverton segment. This alternative expanded capacity to 40 trains per day.

Based on the results of the *SJR-55 Study* and the conversations with NS, diversions resulting from the rail improvement outlined in our plan for 2020 could be expected to reach as high as 448,000 units. Allowing for a reasonable margin of error, the 560,000 units on the NS scale was the most likely choice. This level of demand, based on NS information, would result in four pairs of trains per day (four in each direction) with 200 units per train. This represents a decrease in the number of trucks on I-81 by about 3.8 percent per year in each direction.

It is worth noting that additional investments in the rail infrastructure may be possible, but our team believes that any rail plan would have to be accomplished using a reasonable finance plan without funding gaps or relying on state issued debt. Given the lack of origination or termination data regarding freight in the I-81 corridor, we are unable to recommend at this time more rail improvements under these constraints.

A. Rail Issues

2. Describe the impacts of your proposed rail improvements on I-81 truck traffic and Norfolk Southern freight movements, referencing these impacts to existing I-81 truck traffic and Norfolk Southern volumes as percentages.

Figure 1 contains I-81 traffic data and projections obtained from VDOT during the *SJR-55 Study*. The next to last column is the percent of combination trucks in the traffic stream. The percentage the 560,000 diverted truckloads represent of the base year and 2020 forecast year combination trucks are shown in the last column. As this chart makes clear, while the rail improvements occur only in northern Virginia, they have an impact by reducing truck traffic throughout the I-81 corridor. They range from 12 to 26 percent of the base year volumes and 5 to 13 percent of 2020 volumes. The eight trains per day required to transport the same volume of trucks represent an approximate increase of 50 percent of the existing trains south of Manassas, 40 percent between Manassas and Riverton, and 30 percent between Riverton and the Maryland state line.

Figure 1: I-81 Traffic Data and Projections

Milepost/Exit		Base Year	AADT				Trucks		S.U.T.		Combination Trucks		Percent Diversion CT	
Begin	End	'96 or '97	2005	2010	2015	2020	Peak	Average	Peak	Average	Peak	Average	Base	2020
TNSL	1	32,000	39,860	46,700	53,500	60,310	21	24	4	4	17	20	25%	13%
	3	32,000	48,020	53,640	59,200	64,470	21	24	5	6	16	18	26%	13%
	5	40,000	45,390	51,250	57,030	62,670	21	24	3	3	18	21	19%	12%
	10	38,000	54,020	62,908	71,810	80,700	21	24	5	6	16	18	22%	11%
	29	29,500	38,860	44,800	50,560	56,400	22	29	4	5	18	24	21%	11%
	32	29,300	38,590	44,600	50,200	56,000	21	29	4	5	18	24	22%	11%
	45	32,200	44,100	51,800	58,970	66,400	20	29	3	5	17	24	20%	10%
	47	31,000	42,550	50,000	56,990	64,200	20	30	3	5	17	25	20%	10%
	50	29,600	39,550	46,000	51,990	58,200	21	31	3	5	18	26	20%	10%
	54	29,200	39,550	45,000	51,050	56,800	21	32	3	5	18	27	19%	10%
	60	30,200	40,630	46,200	52,210	58,000	20	30	3	5	17	25	20%	10%
	67	28,400	37,930	43,000	48,510	53,800	21	31	3	4	18	27	20%	11%
	70	30,600	41,280	46,670	53,140	59,060	20	29	3	5	17	24	20%	11%
	94	35,440	46,680	51,740	59,160	65,400	22	33	3	5	19	28	15%	8%
	98	36,600	47,250	51,380	59,090	65,000	21	32	3	4	18	28	15%	8%
	105	32,980	42,290	45,680	52,630	57,800	20	33	2	4	18	29	16%	9%
	109	34,780	44,470	47,380	55,230	60,600	21	31	3	4	18	27	16%	9%
	114	33,100	42,220	45,400	52,340	57,400	23	32	3	4	20	28	17%	10%
	118	41,500	52,490	56,200	64,700	70,800	25	28	4	5	21	23	16%	9%
	128	42,800	54,500	58,400	67,500	74,000	26	29	4	5	22	24	15%	9%
	132	44,800	57,330	61,600	71,250	78,200	27	27	5	5	22	22	15%	9%
	137	53,200	68,650	73,800	85,820	94,400	25	24	4	4	21	20	15%	8%
	140	56,700	73,840	79,400	92,880	102,400	25	28	4	5	21	23	12%	7%
	141	63,100	82,570	88,800	104,190	115,000	22	25	4	5	18	20	12%	7%
	143	53,000	68,680	65,800	86,100	94,800	28	28	4	4	24	24	12%	7%
	146	45,400	60,330	67,200	76,910	85,200	27	29	4	4	23	25	14%	7%
	150	31,900	43,040	49,200	55,420	61,600	33	36	5	5	28	31	16%	8%
	156	30,900	41,820	48,000	53,940	60,000	34	36	5	5	29	31	16%	8%
	188	33,300	45,080	51,420	58,160	64,700	31	36	4	5	27	31	15%	8%
	213	44,650	61,380	70,670	79,960	89,250	36	37	5	5	31	32	11%	5%
	235	40,700	56,630	65,720	74,330	83,180	26	32	3	4	23	28	13%	7%
	240	40,780	56,590	65,860	74,160	82,940	25	32	3	4	22	28	13%	7%
	247	42,340	58,300	67,720	76,020	84,880	20	27	2	3	18	24	15%	8%
	257	38,360	52,750	61,360	68,730	76,720	23	31	3	4	20	27	15%	7%
	273	37,500	50,760	60,460	67,320	75,600	19	28	3	4	16	24	17%	8%
	296	39,700	53,900	64,340	71,630	80,500	17	29	3	5	14	24	16%	8%
	298	43,100	58,030	68,740	76,680	86,000	17	29	3	5	14	24	15%	7%
	300	36,200	49,000	57,600	65,000	73,000	20	29	3	4	17	25	17%	8%
	307	39,000	57,750	68,200	78,560	89,000	20	27	3	4	17	23	17%	7%
	317	32,800	43,380	49,200	55,130	61,000	33	33	5	5	28	28	17%	9%
Average													16%	8%

A. Rail Issues

3. Describe any communication with localities or communities of interest in vicinity of proposed rail improvements.

The STAR Solutions team has undertaken several efforts to brief the communities impacted by the proposed rail improvements. All jurisdictions where the rail improvements would be located — the City of Manassas, Prince William County, Fauquier County, Clarke County, and Warren County — received a copy of the entire proposal and were offered the opportunity for a briefing by the STAR Solutions team. To date, none of the communities has contacted the team for such a briefing. Representatives of the STAR Solutions team did, however, participate in a public meeting held by the Northern Shenandoah Valley Regional Commission (NSVRC) at which representatives from the Town of Front Royal, Clarke and Warren Counties were present and asked a number of questions about the STAR Solutions rail plan. On October 11, 2003, STAR Solutions' team representatives also met with members of the Rail Solution group, which is advocating additional rail investment in the I-81 corridor. Representatives of Rail Solution have also been present at many of the local government presentations and the NSVRC forum.



A. Rail Issues

4. Describe your experience and capabilities to plan, fund, design, and build freight rail improvements.

STAR Solutions' team members' rail experience includes a full spectrum of services from feasibility studies and consulting engineering to turnkey construction, project delivery, and operations and maintenance. This experience ranges from designing and managing urban rail projects to leading the consortium on the world's longest, most remote overland build-own-operate-transfer rail project: the \$1.3 billion, 882-mile-long Alice Springs-Darwin rail project in Australia.

Currently, members of this team have contracts with Virginia Railway Express (VRE), Virginia Department of Rail and Public Transportation (DRPT), CSX, Norfolk Southern, Burlington Northern Santa Fe Railroad, Amtrak, Canadian Pacific Rail, Florida East Coast Railway, North Carolina DOT Rail Division, and Union Pacific Railroad Company.

Our rail engineering expertise includes:

- Operational analysis
- Conceptual and system planning
- Railroad corridor location studies
- Track alignments
- Track structures
- Industrial track facility planning and design
- Classification yard planning and design
- Intermodal terminal planning, operations, and design
- Auto ramp facilities planning and design
- Bulk freight handling facilities planning and design
- Track maintenance and rehabilitation planning
- Track inspection
- Grade crossings
- Railroad agreements and easements
- Construction management and inspection
- Cost estimating
- General civil, bridges and structures design

We are currently involved in projects that define and address critical issues that relate to passenger and freight programs and combined passenger and freight operations. We recognize the importance of developing a spirit of cooperation and consensus among all rail stakeholders, and have developed strong professional relationships with leaders in the railroad industry. We have worked closely with agencies, including VRE and DRPT, as well as the Class 1 railroads, CSX and NS included, in the development of corridor plans intended to inaugurate or enhance commuter rail service.



4. Describe your experience and capabilities to plan, fund, design, and build freight rail improvements.

STAR Solutions know that rail yard and station operations, layout, enhancements and expansion are key issues facing Virginia railroads. Our experience with these facilities is extensive and includes current or recent experience at:

- Washington Union Terminal Chicago Union Station (Operations study)
- Sound Transit (Seattle) Maintenance Facility
- Los Angeles Union Station
- Orlando LYNX Commuter Rail Study
- Sonoma/Marin Area Rapid Transit Commuter Study
- Design and/or evaluation services for a proposed Mid-Day Storage Yard, WUT
- Crossroads and Broad Run Yards, Northern Virginia
- Additional projects in California, Arizona Oregon, Colorado, Wisconsin, Nevada, Ohio and Washington

B. Environmental Issues

1. Describe, in aggregate, the environmental benefits of your proposal.

The STAR Solutions' proposal was developed with a focus on providing the best solution for transportation improvements along with the best solution for environmental protection. The project will provide environmental benefits along the length of the project in several ways. First, the STAR Solutions' concept of widening I-81 to at least four lanes in each direction will improve air quality along the corridor by substantially decreasing congestion caused by high volumes of traffic and a high proportion of trucks in the vehicle mix. Trucks and cars that idle or run at low speeds deliver more pollution per unit time than vehicles that move briskly through an area. By adding two lanes in each direction throughout the corridor, not just at localized areas, the improvement in congestion will be dramatic. Several other features of STAR Solutions' proposal will also promote improved air quality. The condensed construction period (a 15-year schedule) means that air quality will improve at a faster rate than with a traditional VDOT schedule. Additionally, as expressed in the Phase One proposal, tackling problem areas at the beginning of the project will help assure that air quality improves faster. Incorporating state-of-the-art "boothless" electronic truck tolling systems, an integrated and technologically advanced intelligent transportation system, and enhanced intermodal options, will keep the traffic moving more briskly thus helping to minimize air pollution.

Additionally, the STAR Solutions' design approach of adding the new lanes within the existing median, insofar as possible, will provide overall environmental benefits. In general, medians are intended for use, whether for safety or for future widening. While the current median may provide some pleasant views, its value as an environmentally important feature is low because the plants and animals within it are stressed and degraded by the presence of the existing lanes and traffic. Habitats and wildlife outside the existing right-of-way are much less stressed and function at higher levels. In addition, many valuable characteristics of the human environment, such as farmlands, residences, and businesses exist only outside the existing right-of-way, not in the median. Construction in the median will ultimately mean less cutting and filling to the outside of existing lanes and less right-of-way acquisition, so that there will be fewer impacts, directly and indirectly, to important resources such as farmlands, water quality, wetlands, endangered species, fisheries, and cultural resources. This is particularly important in the case of 4(f) resources (e.g. parks, wildlife refuges, historic properties), which must be avoided if practical alternatives are available. In our Phase Three Detailed Proposal, we also proposed a Stream Team to address the impact this project will have on the tributaries that transverse it.

The STAR Solutions team will provide soundwalls at a cost of approximately \$84.5 million to address the highway noise issue. This will also improve the tributaries that have to be degraded under the existing highway condition. In addition, we believe that not widening I-81 would force vehicles to use other nearby routes to avoid accidents and congestion. These roads were not designed to handle significant traffic and such volume would endanger scenic, historic and cultural resources. Finally, we believe that our plan to locate truck rest areas in the median instead of enlarging existing rest areas or forcing private truck stops to expand helps to preserve the environment and the viewshed in the I-81 corridor.



1. Describe, in aggregate, the environmental benefits of your proposal.

The STAR Solutions team understands that VDOT will prepare the Environmental Impact Statement (EIS) and related documents for the project. As part of this process, VDOT will develop a full range of mitigation measures designed to minimize adverse impacts to the environment. To complement that effort, STAR Solutions will implement an innovative approach for following up on environmental mitigation commitments. The Permitting Team described in previous submittals will implement a "Post-NEPA Phase Tracking System" that will effectively monitor stated mitigation commitments, changes in environmental impacts during design refinement, additional right-of-way requirements not addressed in the EIS, and new mitigation needed as the project advances through final design and construction. This system will promote environmental benefits by providing accountability and stewardship during the design process; building trust with project stakeholders, including community groups and environmental agencies; and addressing FHWA's requirement for environmental evaluations when design changes result in new impacts.

STAR Solutions is committed to providing stewardship for environmental resources throughout project development and construction.

B. Environmental Issues

2. Describe the process or specific design elements in your proposal intended to preserve the overall aesthetics and/or specific viewsheds in the corridor.

In developing STAR Solutions' innovative proposal, the team has consciously determined that the best overall project value is to prioritize and preserve views external to the right-of-way. This is one of the reasons our team proposes to locate the truck lanes in the interior versus exterior lanes — so that trucks will not block passenger vehicles' view of the scenery. While many areas of the existing I-81 median provide pleasant views, it must be noted that the scenic beauty of the I-81 corridor is primarily derived from viewing distance landscapes, sometimes miles from I-81, such as the farmsteads along the Shenandoah Valley, the Blue Ridge Mountains to the east and the Shenandoah and Allegheny Mountains to the west. These views would be largely undisturbed by the STAR Solutions' approach to widening within the existing median wherever possible. In fact, when the high per-lane traffic volume decreases after four lanes are added, motorists and their passengers will be able to better appreciate the views that are available from the roadside.

VDOT's EIS for the project will likely contain a process to address key viewpoints and key viewshed features, viewshed impacts and preservation. The process will include several steps:

- 1) inventory and analysis of major views
- 2) before and after graphic analysis
- 3) decision-making matrix for prioritization of key viewshed preservation areas, and
- 4) where needed, design enhancements to preserve the most valuable views.

The STAR Solutions team will carry that process into the design and construction phase of the project. The "Post-NEPA Phase Monitoring" process will preserve the integrity of any viewshed mitigation commitments made in the EIS. Any design refinements will be assessed for needed viewshed mitigation elements using existing imagery and postconstruction graphics. Opportunities for viewshed enhancements as mitigation will be pursued, such as rehabilitating disturbed areas adjacent to the right-of-way. In addition, the STAR Solutions' approach to this project involves elements of flexibility. If the EIS process or community involvement show that certain median viewshed areas should be preserved, the design refinements can incorporate those elements. Additionally, opportunities may exist to add architectural elements to the truck separation barriers that the team has proposed. From an overall project standpoint, the STAR Solutions proposal will, in many ways, promote preservation of valuable views.

The following page shows an example of a "before" and "after" shot of STAR Solutions' proposed design that features widening within the existing median. On page B-5 is an "after" shot of the proposed widening within the existing median in the Mt. Jackson area.

2. Describe the process or specific design elements in your proposal intended to preserve the overall aesthetics and/or specific viewsheds in the corridor.

Before



After



2. Describe the process or specific design elements in your proposal intended to preserve the overall aesthetics and/or specific viewsheds in the corridor.



Proposed widening within the existing median in the Mt. Jackson area.

C. Traffic Issues

1. Provide details of any vehicle diversion studies you have performed, including likely diversion rates and routes.

The STAR Solutions team considered alternative routes to I-81 and concluded that there were no realistic alternatives in or immediately adjacent to the I-81 corridor. This is based on our analyses of Routes 11 and 29 where we considered the number of traffic signals, bus stops, speed limit changes and traffic volume. Even corridors far from I-81, including I-95, I-77 or I-75, have congestion or cost-related issues that make these routes impractical alternatives. Further, during the past 20 years, companies have invested billions of dollars in manufacturing and distribution facilities in the I-81 corridor that will still need to be served and cannot be easily relocated away from the customer base. However, being conservative, our design still assumed as much as a 20 percent diversion to other routes. This amount includes the diversion that could occur if our rail plan is fully implemented. The success of any project that is funded through user fees is dependent on accurate estimates of traffic volume, growth and diversions. This is why the STAR Solutions team took an even more conservative approach when developing the financial plan and assumed a 20-40 percent diversion rate to rail or alternative routes — even though we do not consider such rates to be realistic. Therefore, because we think actual diversion will be less than these amounts, it could result in additional funds to support other improvements, maintenance, or to adjust the toll rates.

As part of our diversion analysis, several “typical” trip origins and destinations were selected for use in a manual toll diversion assignment process, since no origin-destination or interchange-to-interchange data were available for incorporation into a computerized traffic assignment when the traffic and revenue assessment was conducted. This manual process employs the same toll diversion logic used in computer-aided traffic assignments that estimates the market share between the toll facility and the available alternative route based on ratios of generalized costs of using each routing. For each pair of “typical” trip origins and destinations, two routings were selected, one using the I-81 project and the other using an alternative route.

The market share calculation takes into account the total trip cost via each path (toll facility and alternative.) Where total costs, including tolls, are equal between the two paths, a 50/50 percent split in the toll road/alternate route market share would be estimated. As travel time and distance savings afforded by the toll alternative increase (thereby increasing the cost advantages of the toll project), the toll road share of traffic will also increase. Conversely, as savings decrease, the toll project market share of traffic will decrease.

The main elements impacting the market share calculations are:

- The Value of Time (“VoT”) or Willingness to Pay Tolls can be considered to estimate the amount of money a driver will pay to reduce his/her journey time. VoT will in total or in part “offset” toll charges. The greater the time savings, the higher the toll road market share. Estimated VoT were derived from a general knowledge of typical costs for toll road studies conducted in the U.S.
- Vehicle Operating Costs (“VOC”) are another important element in the market share estimates. The greater the cost savings afforded by the project, the greater the toll road market share. The primary distinction is made with regard to trip length and where the toll project offers advantages.

1. Provide details of any vehicle diversion studies you have performed, including likely diversion rates and routes.

- Cost of Tolls is the final element in the equation.

Based on these considerations, some “typical” origin-destination pairs were selected to estimate traffic diversion percentages from the project. Some “typical” movements included trips between:

- Winston-Salem/Charlotte and Richmond/Charlottesville
- Winston-Salem/Charlotte and Washington, D.C./Baltimore and/or points north
- Atlanta/Chatanooga/Knoxville and Washington, D.C./Baltimore and/or points north
- Roanoke and Blacksburg

Trip distances and travel times were calculated between the origin-destination pairings for the toll project and alternative routings with assumptions made for route travel speeds. Diversion percentages were then estimated for alternative toll rates and trip lengths (short, medium, long distance.) Using this manual diversion process calculation and “typical” or representative long, medium and short distance trip pairs, we determined that 20 to 40 percent of the toll-free heavy truck traffic would divert to alternate routes, if realistic routes existed. This percentage varies by highway segment and is contingent on toll rates levied, project phasing, the availability of proximate and/or convenient alternate routes, among other things.

C. Traffic Issues

2. Provide overview of I-81 traffic studies (including present and future car/truck ratios) documenting how the proposal satisfies the Level of Service design criteria of accommodating the projected traffic for a minimum of 20 years after the completion of construction.

STAR Solutions reviewed the existing traffic on I-81 from 1990 to 2000. From these years, we determined the historical traffic growth. This is shown in Figure 2.

Figure 2: Existing Traffic from 1990 to 2000

General Locations		Exact Locations from VDOT Traffic Count Books		1990	2000	Annual Growth Rate*	11-Year Growth Percent
From	To	From	To				
Bristol	I-77 S	Route 75	US 11 / US 58	25,800	40,000	4.07%	55.04%
I-77 S	I-77 N	US 52/ SR 121	I-77 Fort Chiswell	19,950	48,000	8.31%	140.60%
I-77 N	Rte. 460	Route 177	Route 8	20,400	36,000	5.30%	76.47%
Rte. 460	I-581	Route 419	I-581	36,000	66,000	5.66%	83.33%
I-581	US 220	I-581	Route 115	31,300	53,000	4.90%	69.33%
US 220	I-64 S	US 60	I-64	16,250	37,000	7.77%	127.69%
I-64 S	I-64 N	US 11	I-64	19,500	44,000	7.68%	125.64%
I-64 N	Rte. 33	US 11	Port Republic Rd	24,550	43,000	5.23%	75.15%
Rte. 33	I-66	Route 55	US 11	13,250	39,000	10.31%	194.34%
I-66	Rte. 37 S	Route 277	Route 37 South	19,050	42,000	7.45%	120.47%
Rte. 37 S	Rte. 37 N	US 50	Route 7	23,500	51,000	7.30%	117.02%
Rte. 37 N	WV Line	US 11	WV State Line	17,650	35,000	6.42%	98.30%

* Calculated using the 1990 and 2000 VDOT Traffic Count Books

We also reviewed VDOT's projected traffic for the study completed in 1998 and the percent of traffic growth used to determine that projected growth. Additionally, we used the truck percentage used by VDOT in their projections. In spite of FHWA's prediction that truck traffic was doubling in 20 years, we made our projections using VDOT's methods which were more conservative than the historical growth rate. Further, our analysis assumed that the mix of cars and trucks would remain constant during the construction period even though truck traffic is growing faster than car traffic, thus underscoring the need for a four-lane project and car and truck separation.

To determine the Level of Service, we converted the truck traffic to Passenger Car Equivalents (PCE) using two PCEs per truck. A PCE is the number of passenger cars displaced by a single heavy vehicle of a particular type under specified roadway, traffic and control conditions. The type of terrain (level, rolling or mountainous), the percent of upgrade or downgrade and the length of the grade are what drive the PCE. The projected traffic for 2025 and 2035 and the PCE for both years are shown in Figure 3 on C-5. To determine the validity of these projections, we reviewed it against the projected counts in the Roanoke area, which were done for VDOT by Anderson and Associates.



2. Provide overview of I-81 traffic studies (including present and future car/truck ratios) documenting how the proposal satisfies the Level of Service design criteria of accommodating the projected traffic for a minimum of 20 years after the completion of construction.

STAR Solutions' projections were lower in the area between Christiansburg and Roanoke, considerably lower between Roanoke and Route 460 in Botetourt County, and higher from Route 460 in Botetourt County to I-64 in Lexington. This indicates that our projections were valid pending further traffic modeling.

Using the 2025 and 2035 traffic projections and PCEs, we accomplished a planning level capacity analysis. This analysis provided the lane requirements provided in Figure A-6, pages A-20 to A-32 in our Phase Two Detailed Proposal. These capacity figures should be representative of this analysis with the exception of the Winchester area. In that area, we anticipate introducing the dedicated truck lane at MP 307, which is south of the Winchester. The area from MP 307 to the West Virginia Line will consist solely of General Purpose Lanes and Collector Distributor lanes.

Our analysis shows that at least four lanes in each direction are what is needed to adequately handle anticipated traffic volume in the I-81 corridor. We also believe that the separation of cars and trucks as proposed by the STAR Solutions team will improve LOS and safety throughout the corridor.

Figure 3: Projected Traffic for 2025 and 2035

From	To	Annual Growth Rate	Projected 2025 Volume	Projected 2035 Volume	% Trucks	Projected 2025 Trucks	Projected 2035 Trucks	2025 PCE*	2035 PCE*	Projected 2025 Cars	Projected 2035 Cars	Car/PCE Ratio 2025	Car/PCE Ratio 2035	LOS# 2025
Bristol	I-77 S	2.18%	85,800	106,300	0.28	24,000	29,800	48,000	59,600	61,800	68,600	56/44	54/46	C
I-77 S	I-77 N	3.62%	167,200	238,600	0.20	33,400	47,700	66,800	95,400	133,800	193,000	67/33	67/33	C**
I-77 N	Rte. 460	1.85%	63,000	75,600	0.32	20,200	24,200	40,400	48,400	42,800	42,600	52/48	47/53	C
Rte. 460	I-581	2.77%	131,800	173,100	0.27	35,600	46,700	71,200	93,400	96,200	120,800	58/42	57/43	D
I-581	US 220	2.40%	106,800	135,300	0.25	26,700	33,800	53,400	67,600	80,100	94,400	60/40	59/41	D
US 220	I-64 S	2.74%	97,600	127,800	0.30	29,300	38,300	58,600	76,600	68,300	84,700	54/46	53/47	C
I-64 S	I-64 N	2.74%	97,600	127,800	0.37	36,100	47,300	72,200	94,600	61,500	74,500	46/54	44/56	C
I-64 N	Rte. 33	2.80%	98,900	130,300	0.27	26,700	35,200	53,400	70,400	72,200	91,100	58/42	57/43	D
Rte. 33	I-66	2.71%	97,000	126,700	0.26	25,200	32,900	50,400	65,800	71,800	89,500	59/41	58/42	C
I-66	Rte. 37 S	2.20%	77,600	96,400	0.24	18,600	23,100	37,200	46,200	59,000	67,300	61/39	59/41	C
Rte. 37 S	Rte. 37 N	2.98%	120,700	161,800	0.23	27,800	37,200	55,600	74,400	92,900	121,800	63/37	62/38	D
Rte. 37 N	WV Line	0.99%	60,300	66,500	0.28	16,900	18,600	33,800	37,200	43,400	35,200	56/44	49/51	D

***Passenger Car Equivalent(PCE)** – The number of passenger cars displaced by a single heavy vehicle of a particular type under specified roadway, traffic and control conditions. The type of terrain (level, rolling or mountainous), the percent of upgrade or downgrade and the length of the grade are what drive the PCE.

**Will be Level of Service if I-81 and I-77 do not use the same roadway in the Wytheville area.

To maintain the 2025 Level of Service in 2035, additional lanes or diversions are required in selected areas.

Level of Service reflects peak or heavy periods of travel, during normal operations LOS C will be B and LOS D will be C.

C. Traffic Issues

3. Provide a summary of any Traffic and Revenue studies.

WSA prepared preliminary traffic and revenue estimates using VDOT average daily traffic (ADT) data extracted from I-81 Improvement Studies. Two-way ADT volumes along with passenger and commercial vehicle percentages were provided for each mainline segment for years 1996, 2005, 2010, 2015 and 2020. From this data, toll-free commercial vehicle volumes by segment were estimated for the base year, 1996, and future years.

A manual toll diversion analysis was then utilized to develop traffic volume estimates for I-81 operated as a tolled facility. The diversion analysis estimates the number of vehicles that would remain on the highway under tolled conditions. Since no origin-destination data were available for use in this analysis, some hypothetical trip origin and destination pairs were identified. Some of the origin-destination pairs included trips along the entire stretch of I-81 from the I-77 Interchange to the Washington, D.C. area and points north and, from the southeastern states to I-64 corridor cities of Charlottesville and Richmond. Other origin-destination pairs were also selected.

For each movement in the corridor, the cost of making the trip on I-81 was compared with the cost of making the trip via an alternative existing highway route. The costs associated with trip-making consist of three items: the distance traveled, the time it takes to make the trip, and any toll costs associated with the trip. All costs are expressed in dollars by applying a value of time and a cost per-mile to the travel time and distance, respectively. A percentage of trips are retained on the project, in this case I-81, based on a cost ratio that compares the cost of a trip using I-81 to the cost of a trip using the next best alternate route.

Because of the exploratory nature of this analysis, a computerized traffic modeling approach was not utilized. While several alternate toll rates were assessed, it was not possible to determine if these rates represented the optimum toll. However, rates tested were within a range of rates currently levied on existing toll roads operating in the United States.

The finance plan is based on a toll rate of \$0.109 per-mile (in 2003 dollars) levied on heavy commercial vehicles during construction and \$0.229 per-mile (in 2003 dollars) on phases where the dedicated lanes have been completed. These rates are comparable to toll rates currently charged heavy commercial vehicles by other inter-city toll roads and turnpikes in the U.S., even though those facilities do not include many of the freight-oriented improvements envisioned in the STAR Solutions plan.

For comparison purposes, Figure 4 on the following page presents current per-mile toll rates for five-axle, commercial vehicles on selected comparable U.S. inter-city toll roads and turnpikes as well as the 2020 inflated toll rates on these roads.

The traffic data was then used to calculate needed revenue during and after construction. An explanation of our methodology, which permits each construction segment to be independently financed, is included in questions D-3 and E-3.

3. Provide a summary of any Traffic and Revenue studies.

Figure 4: Truck Per-Mile Toll Rates (as of August 2003)

<u>Toll Facility</u>	<u>Toll Rate</u>	<u>2020 Inflated Toll Rate</u>
Delaware Turnpike	\$0.450	\$0.744
Florida Turnpike	\$0.163	\$0.269
Maryland Turnpike – JFK Highway	\$0.160	\$0.264
Kansas Turnpike	\$0.103	\$0.170
New Hampshire Turnpike – Blue Star	\$0.217	\$0.359
New Jersey – Atlantic City Expressway	\$0.227	\$0.375
New Jersey Turnpike	\$0.190	\$0.314
New York Thruway – Mainline Section	\$0.120	\$0.198
Ohio Turnpike	\$0.120	\$0.198
Oklahoma – Will Rogers Turnpike	\$0.161	\$0.266
Pennsylvania Turnpike – East-West Section	\$0.155	\$0.256
West Virginia Turnpike	\$0.145	\$0.240

The assumed heavy commercial vehicle toll rates on I-81 are in fact lower than the rates on other existing toll roads in Virginia such as the Chesapeake Expressway, the Dulles Greenway and the Powhite Parkway.

D. Construction and Design Issues

1. Provide commitments and plans to use local contractors and consultants.

One of the most important community benefits of the I-81 corridor improvements project is STAR Solutions' philosophy in keeping the work local. We will actively seek out the local work force, resources and construction equipment, which will facilitate a smooth start-up and allow successful completion of the project. This will also result in new jobs for Virginians and new tax revenues for state and local governments. By forming a team with APAC, Adams Construction Company, Branch Highways, Citigroup Global Markets, English Construction Company, Fairfield Skanska, KBR, Koch Performance Roads, Lanford Brothers, Lehman Brothers, Moore Brothers, Morgan Keegan & Company, W-L Construction & Paving and Wilbur Smith Associates — firms with a significant Virginia presence — STAR Solutions is qualified to execute this project by offering:

- A solid organization for design-build-operate-finance project execution
- Team members with a long tradition of business with VDOT
- Qualifications and relevant experience that are unmatched
- Proven track record of partnering with the public sector to deliver safe, quality and environmentally-sensitive roads

Collectively, these partner team members have more than 900 years experience in all aspects of transportation planning, design construction and financing and are experienced in successfully delivering major projects for VDOT. Other members include key design firms and financial, operations, legal and public involvement consultants.

Several firms on the STAR Solutions team have already demonstrated their commitment to this project by signing an exclusive Memorandum of Understanding with KBR. These firms include:

- American Consulting Engineers PLC
- CH2M Hill
- Earth Tech
- HDR, Inc.
- HNTB Corporation
- Hayes, Seay, Mattern & Mattern, Inc.
- Parsons Brinckerhoff Quade & Douglas, Inc.
- URS Corporation
- Wilbur Smith Associates

Members of the STAR Solutions team have been working on the I-81 corridor for decades. Our contracting team helped build and maintain the road. Our engineering team helped to design it. Eight of the ten I-81 Improvement Studies completed for VDOT in 1998 were done by STAR Solutions' team members. Our team was assembled because of this experience.

D. Construction and Design Issues

2. Describe what percentage of your proposal includes a grassed or landscaped median strip.

There are three different types of median areas. One type will be the median that results from the vertical difference between the northbound and southbound lanes. This area is currently best represented by the profile of I-81 as it traverses Christiansburg Mountain. This type of median constitutes 20 miles of STAR Solutions' design.

The second type is the median that has grass or landscaping between the new dedicated truck lanes and the existing lanes. This type of median constitutes 42 miles.

The remaining type of median will be the narrow median. Of those 255 miles, the amount of median that can be preserved will vary based on the amount of available right-of-way and the amount of widening needed to address traffic growth. Working with VDOT, we could consider acquiring additional right-of-way in selected areas to provide additional grassed or landscaped medians.

D. Construction and Design Issues

3. Describe phasing and segmentation plans. How will or can these be modified to account for NEPA requirements for logical termini and independent utility? Does your financing plan allow flexibility to modify phasing and segmentation plans?

NEPA Requirements

Prior to submitting the unsolicited proposal in January 2002 and the solicited proposal in January 2003, STAR Solutions studied the information from VDOT's Conceptual Plan and had discussions and meetings with the Virginia FHWA office about the NEPA process. Based on that study and discussions, STAR Solutions developed the concept of breaking I-81 into seven potential segments of logical termini and independent utility for the NEPA process. The seven segments we identified as potentials:

1. From the first interchange in West Virginia south to the interchange of I-66/I-81
2. From I-66/I-81 interchange to I-64/I-81 interchange in Staunton
3. From I-64/I-81 in Staunton to I-64/I-81 in the vicinity of Lexington
4. From I-64/I-81 in the vicinity of Lexington to around Milepost 134 south of I-581 to incorporate the Roanoke/Salem traffic
5. From Milepost 134 to the north interchange of I-77/I-81 in the vicinity of Wytheville
6. From the north interchange of I-77/I-81 to the south interchange of I-77/I-81
7. The final segment would be from the south interchange of I-77/I-81 to Exit 7 in Bristol.

Considering the traffic information from VDOT's Conceptual Plan, an understanding of the environmental issues throughout the corridor, the intersecting interstates with I-81, and the need for focused public involvement during the NEPA process, it was STAR Solutions' opinion that the case could be made for the above segmentation of the corridor for the NEPA process.

From our study of the Corridor, our understanding of the environmental concerns in each of the segments, and the traffic between the north and south interchanges of I-64/I-81, only an Environmental Assessment (EA) would be required for Segment 3, which would require less time to complete than most of the other segments. Therefore, we planned to concentrate our initial construction effort in this segment and expand outward as the environmental documents were completed. This allows us to open the completed work in a logical progressive fashion that helps to eliminate the continuous weave/merge conditions on the mainline that would occur under a different, widely disbursed construction plan. This concept also places the separated truck and car traffic in its final configuration in a progressive manner that should facilitate traffic management and toll enforcement.

In addition, we had planned to reconstruct widen, or replace all of the mainline structures and work on the off-system improvements throughout the corridor simultaneously with our major construction efforts. This would enhance our maintenance of traffic schemes and help to limit the impact to the citizens during construction of our interchanges in particular. Since it will be necessary to maintain two lanes of travel in each direction on the mainline of I-81 during widening and because a majority of the mainline structures do not meet current safety standards for

3. Describe phasing and segmentation plans. How will or can these be modified to account for NEPA requirements for logical termini and independent utility? Does your financing plan allow flexibility to modify phasing and segmentation plans?

shoulder width, consideration has been given to approaching FHWA about widening or reconstructing those mainline bridges by doing Categorical Exclusions (CE) for those structures while the NEPA process is still on going to allow for advance bridge construction. The results of the CE's could be incorporated into the main NEPA documents for the various segments. This would enhance STAR Solutions' ability to provide the two lanes during construction and improve safety during mainline construction by minimizing lane shifts and associated weaving movements.

Financing Plan Flexibility

STAR Solutions' financing plan is closely integrated with the construction schedule for each phase of our I-81 project. Yet, the financing plan has the flexibility to be modified if phasing and segmentation changes for subsequent phases are made after one or more of the initial phases of the project have been fully funded. This is because completion risk is mitigated by funding all costs to be incurred through the completion of each phase from fully committed aggregate sources that are sufficient to provide all funding necessary for the completion of that respective phase.

In the case of each of the four projected series of toll revenue financings (Toll Revenue Bonds and TIFIA Loans projected to be originated in 2005, 2010, 2012 and 2015), our financing plan assumes the availability of projected net toll revenues only from the phases that are already completed or are fully funded and guaranteed to be completed, on time and on budget. These projected net revenues are sufficient to repay all Bonds and Loans that will be outstanding after the full funding of all costs needed to complete each phase. The alternative would be to expose holders of outstanding Bonds to the speculative risk that, if the remaining needed financing for completion of a subsequent phase of the project cannot be arranged, the credit quality of the outstanding Bonds and the entire financing plan would be seriously jeopardized.

Specifically, when STAR Solutions' 1st tranche of Bonds and TIFIA Loan are issued (projected in the financing plan in 2005), the targeted debt service coverage of the 1st series of Bonds and the 1st TIFIA Loan is provided by projected net revenues from:

- a) the Interim Toll on Phase 1 during its construction
- b) the Completed Toll on Phase 1 after its completion (which has been fully funded in the 1st tranche of financing)
- c) Interim Tolls on Phases 2, 3 and 4 during the projected construction period of those phases

No revenues from the Completed Toll on Phases 2, 3 and 4 are included in the projected net revenues for the 1st tranche of financing.

Similarly, when the 2nd tranche of Bonds and TIFIA Loan are issued (projected in the financing plan in 2010), the targeted debt service coverage of the 1st and 2nd series of Bonds and the 1st and 2nd TIFIA Loans is provided by projected net revenues from:

- a) the Interim Toll on Phase 2 during its construction
- b) the Completed Toll on Phases 1 and 2 (since the completion of Phase 2 has now been fully funded in the 2nd tranche of financing)

3. Describe phasing and segmentation plans. How will or can these be modified to account for NEPA requirements for logical termini and independent utility? Does your financing plan allow flexibility to modify phasing and segmentation plans?

c) Interim Tolls on Phases 3 and 4 during the projected construction period of those phases.

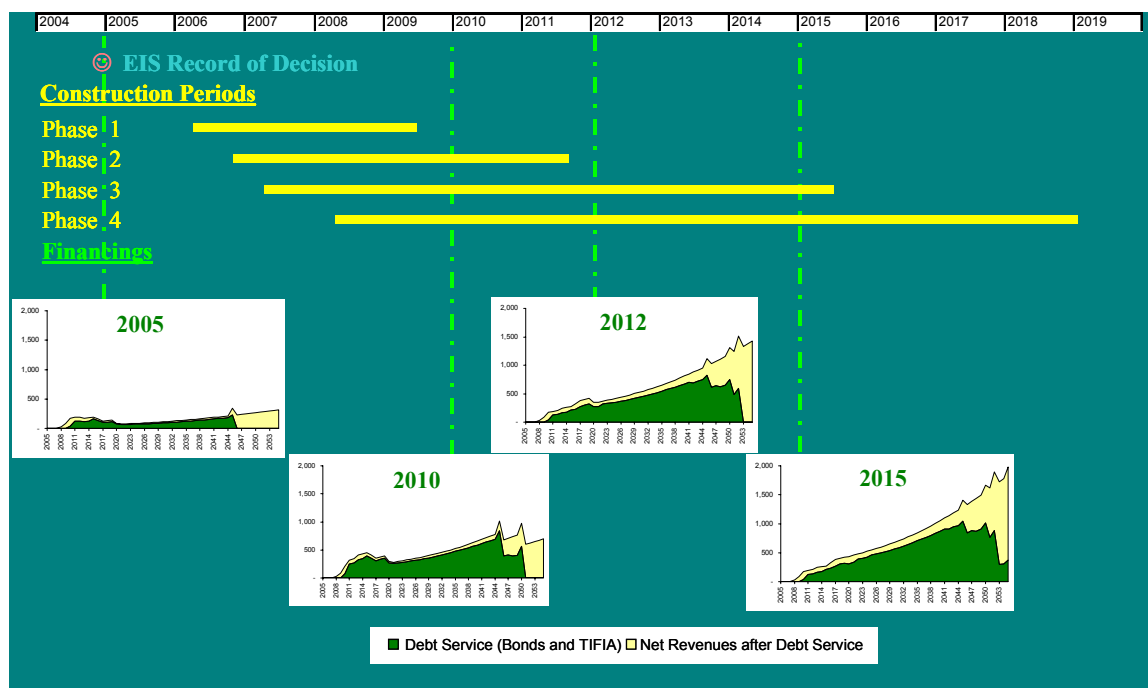
No revenues from the Completed Toll on Phases 3 and 4 are included in the projected net revenues for the 2nd tranche of financing.

And so forth for the 3rd tranche of Bonds and TIFIA Loan when Phase 3 is fully funded.

Of course, when the 4th tranche of Bonds and TIFIA Loan are issued to fully fund Phase 4 and complete the entire project, projected net revenues from all four fully funded phases are used in the financing.

Figure 5 illustrates the relationship between the four construction phases and the four financings for the project.

Figure 5: Construction Phases and Financing



It is also important to recognize that substantial costs throughout the I-81 Corridor are funded in each tranche of financing, not just the costs related to the construction completion of the next phase. For example, during the first five years of the I-81 project (2004-2008), STAR Solutions will be spending funds not only to complete Phase 1 of the I-81 project but also to advance the three other phases. Approximately 58 percent of the \$1.9 billion estimated to be expended during the 2004-2008 period is projected to be spent on costs relating to Phases 2, 3 or 4, while only 42 percent of the estimated total expenditures during the 2004-2008 period are required to complete Phase 1.

D. Construction and Design Issues

4. Provide examples of truck flyovers as indicated in your proposal. Also include information regarding the proposed mix of cars and trucks that will be traveling in the general purpose lanes in your proposal.

The following pages include examples of flyovers. The first is a photo of a flyover on the Dulles Toll Road; the second is a schematic design of STAR Solutions' proposed typical flyover on I-81.

The general purpose lanes will only have the truck traffic that needs to exit as well as the trucks entering the interchanges between the flyover locations. Most of the general purpose lanes will carry a small percent of the truck traffic. The percents for those areas are shown in Figure 6.

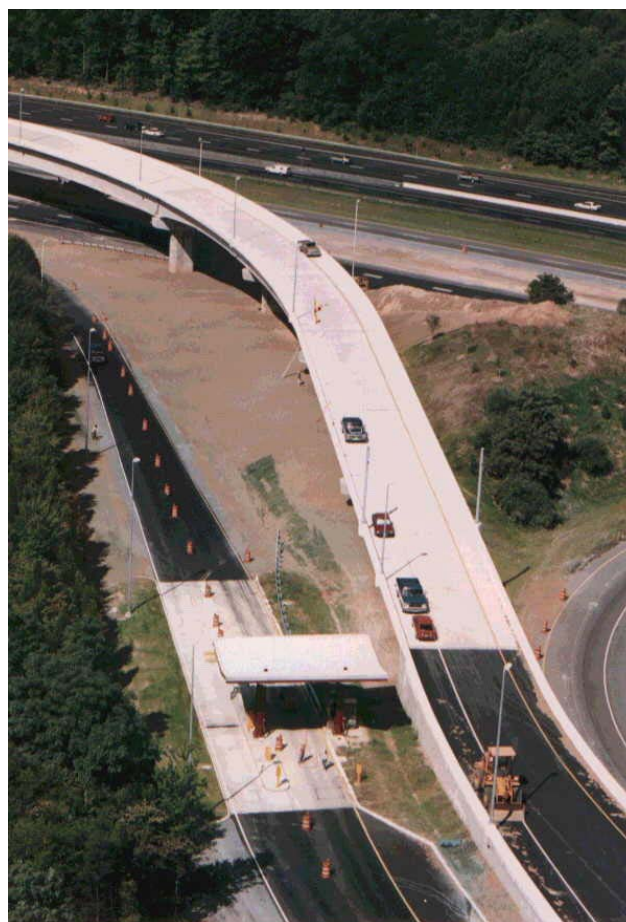
The greatest percentage of truck traffic outside of the dedicated truck lanes is restricted to a couple of areas. These are Roanoke, Staunton and Harrisonburg, which has 10 percent, 14 percent and 10 percent, respectively. In Staunton and Roanoke, the car and local truck traffic will be dispersed between through-lanes and CD roads, thus further reducing car and truck interaction. If the dedicated truck lanes are not built in those areas they would have 27 percent, 37 percent and 27 percent, respectively. Reducing the truck/car mix, which is provided under this proposal, will provide for a much safer and more efficient roadway system.

Figure 6: Percentage of Truck Traffic Using General Purpose Lanes

Milepost	Milepost	%Trucks	
7	35	3%	
35	72	3%	
72	81		Route 77 Overlap Section will have Dual Interchanges
81	114	5%	
114	132	10%	
132	150	10%	
150			Rte 220 will have a Dual Interchange
150	175	8%	
175	191	8%	
191			Route 64 will have a Dual Interchange
191	205	4%	
205			Route 606 at Raphine will have a Dual Interchange
205	235	14%	This includes the Collector Distributor Roads at the I-64 North Interchang
235	273	10%	
273	300	6%	
300			Route 66 will have a Dual interchange
300	307	3%	



Dulles Toll Road Flyover



E. Finance/Administration

1. Describe all warranties, guarantees and assumptions of project risk in your proposal.

A 20-year pavement warranty is offered by STAR Solutions' team member Koch Performance Roads, Inc. (KPRI) as a key feature of our proposal, which is described in detail in Question E.5., Pavement Warranty and Toll Impacts. The 20-year pavement warranty should be viewed as a significant contribution of equity to the project. Although VDOT purchases the warranty (which is paid for through toll revenues), it is anticipated that the warranty itself will reduce future pavement maintenance expenses that would be incurred by VDOT absent the warranty. For example, VDOT paid \$10 million for the warranty on Route 288 but estimated the cost to provide its own maintenance over the 20-year life of the project would be \$17-\$18 million. This savings should be seen as a contribution of equity by the STAR Solutions team because of the risks shifted from VDOT to the private sector and the costs savings, which accrue to VDOT that can be spent on other projects statewide. Such a reduction in life-cycle costs is achieved through the PPTA framework. Further, since the total amount of the warranty is carried as a liability on the KPRI balance sheet, thus tying up those funds and eliminating their use for other corporate initiatives, it is nearly identical to making a direct capital commitment to this project.

STAR Solutions proposes to assume price and construction schedule risk for each phase of the project once the project scope definition has been defined by the NEPA process and the location and design process has been advanced to a point where a competitive price can be developed without placing undue financial burden on the project. STAR Solutions is also willing to enter into a Comprehensive Agreement with VDOT that contains financial penalties in the form of limited liquidated damages that would be imposed if each phase of the project is not finished on time.

STAR Solutions also anticipates that the Comprehensive Agreement will contain a five-year warranty on the performance of the work not otherwise covered by the pavement warranty provided by KPRI.

STAR Solutions further demonstrates its commitment to the Interstate 81 Improvements project by KPRI offering, subject to requisite approvals, a \$100 million revolving line of credit that can serve as a backstop for Bond debt service that is scheduled to be paid until the completion of construction of the entire project.

STAR Solutions anticipates that the Comprehensive Agreement will include Kellogg Brown & Root's (KBR) acceptance of design and construction responsibilities at an acceptable price and provide a performance warranty and/or guarantees at the appropriate time. To achieve that goal, KBR will supply a Halliburton Company parent company guarantee to support its performance on the engineering, procurement, construction (EPC) contract, or if appropriate, ensure that another entity, acceptable to VDOT, supplies the necessary guarantee. In addition, for the construction phase of the project, KBR will provide, or cause to be provided, a payment and performance bond to support these guarantees naming VDOT as obligee.

The goal of all of these is to shift risk from VDOT to the project team as well as protect the Commonwealth in the nature of a true public-private partnership.

E. Finance/Administration

2. Describe any highway or rail “non-compete” clauses or any other provision that would limit the ability of the Commonwealth, corridor localities or railroads from undertaking any type of transportation improvement or cause such an improvement to have an impact on this project.

As stated in our Phase Three Detailed Proposal, STAR Solutions proposes to negotiate with VDOT a non-compete clause that would protect the I-81 project's ability to generate toll revenues by considering the effect on the I-81 project's financial viability if VDOT or other appropriate State agency were to construct, finance or facilitate significant transportation improvements that could materially adversely affect Heavy Commercial Vehicle traffic on I-81 and thus the bond rating on the underlying debt. However, if ratings would remain at or above their original level, then VDOT or another state agency could proceed with the improvement.

STAR Solutions wants the Advisory Panel members and the public and interested parties to understand the effect of the contemplated non-compete clause. The contemplated clause:

- **Would not prohibit** the Commonwealth and its agencies from assisting with rail or other transportation improvements.
- **Would not prohibit** VDOT from making needed safety improvements to the region's transportation system.
- **Would not preclude** implementation of our proposed Rail Project, which we view as essential for moderating the long-haul truck volume throughout the I-81 Corridor.
- **Would not prohibit or affect** corridor localities or private railroads' ability to make improvements on their own without State assistance or involvement.
- **Would not prohibit** improvements that would divert a defined percentage of Heavy Commercial Vehicle traffic from I-81, as some organizations have mis-stated.

As we stated in our Detailed Proposal, STAR Solutions proposes that our Rail Project be advanced in tandem with the I-81 Project. Our concept is that the same investment grade traffic and revenue study will be used to support both the I-81 toll-based financing for the I-81 Project and the RRIF Loan for the Rail Project. That is, the study will take into account the projected diversion of freight units from I-81 to the improved Norfolk-Southern rail corridor.

Nevertheless, based on our Banking Team's experience with rating agencies and their concerns in many different contexts, STAR Solutions believes that credit rating and marketing considerations will likely require including a VDOT non-compete clause in the toll revenue financing. In our proposals to VDOT, STAR Solutions has been direct and upfront in identifying and addressing the potential importance of this provision to achieve cost-effective financing by protecting bondholders and addressing rating agency concerns.

Given the preliminary nature of the current I-81 toll revenue projections, it is not possible to state the precise form or language of such a VDOT non-compete clause. Yet, the spirit of the clause is that VDOT and other appropriate State agencies would agree, going forward and while any toll revenue obligations remain outstanding, not to construct, finance or facilitate a transportation improvement IF it is then determined that the improvement would harm bondholders or would jeopardize the ability to pay all debt obligations, including repayment of the TIFIA Loans.

2. Describe any highway or rail “non-compete” clauses or any other provision that would limit the ability of the Commonwealth, corridor localities or railroads from undertaking any type of transportation improvement or cause such an improvement to have an impact on this project.

One way to determine if bondholders would be harmed by a proposed improvement is to determine whether the Bonds’ ratings would be reduced below their original ratings. To accomplish this, VDOT or other appropriate State agency would agree to prepare, prior to going forward with the proposed improvement, an updated independent feasibility study by a nationally recognized consultant with expertise in this area. The updated study would evaluate the projected effect of the proposed improvement on the I-81 toll revenue obligations’ future debt service coverage. The rating agencies would require this study in order to evaluate the impact on the I-81 Toll Revenue Bond ratings. If the rating agencies determine that the proposed improvement would result in Bond ratings lower than the original ratings, then VDOT or other state agency could not construct, finance or facilitate the improvement.

STAR Solutions wishes to emphasize that this is only one possible construct for the contemplated non-compete clause. Working with VDOT to further refine the financing plan, we expect that other constructs may be developed.

Finally, the contemplated non-compete clause is intended to assist in accomplishing the financing for the I-81 project at the lowest possible borrowing cost without immobilizing local communities, railroads or the Commonwealth. STAR Solutions is committed to partnering with VDOT, local communities and railroads to develop inter-modally balanced, environmentally-conscious and safety-enhancing improvements throughout the I-81 Corridor. We are also committed to working with VDOT to develop a detailed financial plan for our I-81 project that can be implemented without major surprises. The Commonwealth should expect and receive no less.

E. Finance/Administration

3. Describe the factors influencing your proposed toll implementation date, specifically addressing whether this date is based on levels of completed construction or is fixed due to restrictions in the plan of finance.

STAR Solutions' finance plan includes multiple implementation dates for tolls. Each date is specifically related to the construction process for each phase rather than being fixed due to restrictions in the plan of finance. If any adjustments are made to the timing of a phase prior to its full funding, corresponding changes can be expected in toll implementation dates and the financing plan.

Two types of tolls are included in the STAR Solutions plan of finance: an Interim Toll and a Completed Toll. The Interim Toll (approximately one-half of the rate of the Completed Toll) is projected to be implemented on each phase when construction in that phase is projected to begin. We project that all four phases of the project will begin construction during the 2006-2008 period. Financing for all costs associated with the first phase is projected to be arranged in 2005, when Phase 1 has received all required environmental clearances under the NEPA and federal approval process. Therefore, STAR Solutions' fulfilling the projected date for the onset of construction of the phases is important for the success of the first financing. We anticipate that the design-build contract will provide assurances that construction can begin as projected. If this assurance is not possible at the time of the first tranche of financing, the first series of Bonds and TIFIA Loan would be sized based on the projected net revenues from Interim and Completed Tolls only from Phase 1. These proceeds would be used to fund, at a minimum, completion of Phase 1. When construction has begun on the three other phases (currently projected in 2008), another financing would leverage Interim Tolls from those three phases to fund the remaining costs through 2009.

When the 2nd tranche of financing is accomplished (projected in 2010), Phases 2, 3 and 4 will already be under construction and the Interim Toll will already be implemented on these three phases.

The Interim Toll continues on a phase until all construction of that phase is complete, after which the Completed Toll, at a higher toll rate, is implemented. The projected net revenues used for each financing are predicated on a projected completion date for the respective phase that is fully financed by that tranche of financing. Therefore, the construction completion guarantees, which will be provided over time as each phase is fully funded, will be critical to the success of each tranche of financing.

The TIFIA loans will only be paid by toll revenues and STAR Solutions is not expecting a state backup for them.

E. Finance/Administration

4. Describe and provide cost estimates for toll enforcement in the corridor, including a description of any necessary legislative actions, the strategies for accomplishing these actions and how your proposal envisions funding this enforcement.

Equipment costs associated with toll collection and enforcement and implementing a violations processing center for the I-81 corridor are funded in our financing plan. The total estimated cost of our toll equipment is \$75.38 million (2003 dollars) assuming only heavy commercial vehicles are tolled. Toll enforcement equipment that is acquired as part of I-81 project costs includes the equipment needed in the lanes to capture front and rear images of trucks that either do not have a tag or whose account does not have sufficient funds, as well as equipment required for transmission of these images to the processing center, the review and automated capture of license plate information, the retrieval of the address information from a national database of department of motor vehicle information through a third party, the generation and mailing of a violation notice, the tracking and aging of such notices, and the generation of a citation and court summons for repeat offenders or those who ignore 1st and 2nd notices.

The projected toll collection costs in our financing plan include the base fixed ongoing staff operating costs for violations processing through the generation of citations and court summons. These estimated base fixed operating costs assume a relatively low toll violations rate. Additional variable costs related to higher violations rates can reasonably be expected to be funded by the administrative fee charged to violators, above and beyond the toll tariff. Our financing plan does not currently include any projected revenue from such administrative fees. For effective violations processing of I-81 Heavy Commercial Vehicles, the administrative fee would need to be large enough to be a disincentive for attempted avoidance of paying the toll, especially if a truck is traveling the entire length of I-81.

State Police would be necessary to monitor traffic and enforce regular traffic laws, including any trucks that migrate across the rumble strip or median separating the truck only lanes from the general purpose lanes. Additionally, the State highway patrol could also support realtime toll enforcement through transmission of a violations image to the police vehicle so that they can intercept the violator downstream on I-81. Certainly some of the ITS applications we have envisioned include monitoring certain sections of highway with closed circuit television. Our financing plan assumes all state highway patrol costs continue to be borne by the Virginia State Police. But these costs could be reimbursed from net toll revenues available to VDOT after the funding of toll equipment replacement.

Having reciprocal agreements with other state departments of motor vehicles would enhance the accuracy of the address data needed to find toll violators. We did not include costs in our proposal for such agreements; instead, we are relying on a third-party vendor to retrieve the address data for the majority of violators.

The need for legislative actions for photo toll enforcement is unclear. In reviewing Section 46.2-819.1 of the *Code of Virginia*, we do not believe there needs to be any changes to the process by which toll violators are prosecuted except to accommodate advances in toll-monitoring and collection technology that may occur during the construction period. As stated above, consideration should be given to the amount of the fine for toll violations.



4. Describe and provide cost estimates for toll enforcement in the corridor, including a description of any necessary legislative actions, the strategies for accomplishing these actions and how your proposal envisions funding this enforcement.

Further, since our proposed electronic tolling system features detectors throughout the corridor, we will need to determine whether each unpaid pass by the detector is another violation and which locality will serve as the venue for the General District Court proceedings to pursue toll violators.

Such operational issues, and the potential need for changes to state law, will be determined at a later date.

E. Finance/Administration

5. Describe pavement warranty and show impact on tolls (with and without).

Pavement Warranty

The STAR Solutions pavement warranty addresses VDOT funding concerns and transfers risk from VDOT to STAR Solutions. A full 20-year pavement warranty will ensure construction quality, enhance safety, establish and maintain the facility's performance and value on a life cycle basis and reduce VDOT and bondholders future cost risk associated with the pavement.

The ultimate assurance of quality is a guarantee of performance. STAR Solutions' team member Koch Performance Roads, Inc. (KPRI) will manage and guarantee the performance of the project through a 20-year pavement warranty for all mainline, collector-distributor (CD) lanes, ramps and shoulders constructed as a result of this proposal. A warranty for the pavement will effectively transfer the financial risk of the pavement design, materials selection, construction and future pavement maintenance or repairs from VDOT to KPRI. KPRI's pavement warranty ensures that the pavement's performance will meet or exceed the warranty criteria for the life of the warranty. Fully integrating the engineering and construction processes provides a low-maintenance, high-quality pavement, which minimizes the life-cycle project cost to the taxpayer and VDOT while maintaining a superior pavement condition over the 20-year pavement warranty.

The pavement warranty criteria identifies the distresses, which affect the pavement performance during the life of the facility. KPRI proposes to provide pavement warranty criteria that address the performance, such as smoothness, rutting, raveling, cracking, delamination and potholes. If performance or condition of the roadway does not comply with the listed performance criteria individually, at any time during the warranty period, KPRI will provide the appropriate maintenance to the I-81 project to bring the road within the established quality thresholds.

Since I-81 will be designed and constructed in phases, separate truck lanes will be constructed, and will vary with the amount of traffic throughout the corridor, VDOT and KPRI will need to agree on several warranty issues, including the warranty criteria for all the different portions of the roadway, the amount of inflation risk to be taken, the total amount of liability coverage and the amount of traffic usage.

To manage pavement performance during the warranty period, KPRI will measure pavement condition annually on the mainline pavement and ramps. Based on the routine reviews, annual in-depth inspections and the analysis of the data, KPRI will develop a maintenance strategy to keep the pavement in proper condition. Preventive maintenance procedures will be extensively used to not only reduce the costs, but also keep traffic interference to a minimum. The condition data will be compared to the pavement warranty criteria to determine pavement performance and compliance with the warranty criteria. If any of the warranty criteria is outside the agreed-upon limits, KPRI will repair the area so the warranty criteria are met.

KPRI will communicate with VDOT field facilities and offices about any activities, concerns, planning or problems during the warranty period. When maintenance is planned, KPRI will coordinate the work with VDOT to avoid conflicting activities on the road and keep traffic interference to a minimum.

5. Describe pavement warranty and show impact on tolls (with and without).

Tolls with the Warranty

The projected tolls with the warranty are assumed in our proposal to be 12.3 cents per mile interim toll rate beginning in 2007 and 27.4 cents per mile completed toll rate beginning in 2009.

As shown in Figure 7, the pavement design associated with the pavement warranty decreases initial construction costs by \$255 million in the STAR Solutions' life cycle cost analysis versus the VDOT standard design (all in 2003 dollars). As a result of this reduction in construction costs, our proposed toll rates are approximately 5 percent lower than what would be required for the VDOT standard design. Our life cycle cost analysis also indicates that the pavement warranty has a lower cost by \$252 million vs. the VDOT standard maintenance costs (all in 2003 dollars). As a result of this reduction in maintenance costs, our proposed toll rates are approximately 5 percent lower than what would be required to finance VDOT's pavement maintenance costs without the warranty.

Figure 7: Construction and Maintenance Estimates (in 2003 \$)

	Pavement Construction Costs	Pavement Maintenance Costs	Life Cycle Costs
VDOT Standard Design	\$1,604,600,000	\$775,173,000	\$2,379,773,000
STAR Solutions Proposal	\$1,349,600,000	\$522,700,000	\$1,872,300,000

The finance plan already reflects the above total savings of 10 percent on our proposed toll rates.

Tolls Without Warranty

If the finance plan and toll rates were to cover the same construction and pavement maintenance costs that would be part of the warranty, then removing the warranty from the package would cause the proposed toll rates to be 10 percent higher. The result would be an interim toll rate in 2007 of 13.5 cents per mile and a completed toll rate in 2009 of 30.1 cents per mile.

If VDOT does not include the warranty in the final project scope and construction costs and pavement maintenance costs that would have been covered by the warranty are not assumed by VDOT, then our proposed project price would be \$267.7 million lower (\$522.7 million warranty costs less the increase in construction costs of \$255 million) (all in 2003\$). This would result in slightly more than a 5 percent reduction in toll rates; however, the construction and maintenance costs of \$775 million (in 2003\$) would have to be funded through additional VDOT funding sources.

E. Finance/Administration

6. Describe proposed federal pilot program funding, including reimbursement provisions and any possible impacts on any other federal transportation funding that may come to Virginia. Include contingency plans for compensating for any modifications to your plan of finance in the event that any or all of the \$1.6 billion in federal earmarks is not available for this project. Include an explanation of and the timing of any necessary legislative strategies that may be required to accommodate this contingency plan.

STAR Solutions' Detailed Proposal assumes that \$1.6 billion in federal earmarks will be available for project costs during the project's construction period, an average annual amount of \$107 million. Given the national and international significance of I-81 and its role in interstate commerce, we believe pursuing federal funds is a prudent way to help build the project that our traffic studies show is needed to deliver a long-term solution. We anticipate that a major portion of such funding would be authorized initially in the pending six-year re-authorization of FHWA's and FTA's surface transportation programs. The proposed federal funding of dedicated truck lanes on I-81 is more than an earmark for a typical project. Instead, it will represent a federal commitment to a showcase demonstration project that represents a significant new model for transporting freight safely and efficiently throughout the nation. Therefore, STAR Solutions believes that there should be no impact on the Commonwealth's receipt of (a) federal transportation formula funds or (b) designated funds for other meritorious transportation projects in Virginia.

STAR Solutions envisions that the federal earmark funds for the separation of cars and trucks on I-81 will be apportioned and paid to Virginia similarly to other FHWA funds. Since FHWA will manage this project under the SEP-14 process, FHWA will have the flexibility to provide funds to the State as required to pay for work performed. It is envisioned that this process will be set forth in the SEP-14 Agreement.

VDOT should not have to expend its own funds to secure reimbursement of federal funds. In the past, the key issue has been to receive federal reimbursement for work performed. There are various ways that this could be achieved. Our proposed approach is to build into the financing plan sufficient resources that are deposited with either the bond trustee or VDOT. These resources are used to fund expenditures that are subsequently reimbursed by FHWA.

The key is to negotiate with FHWA in the SEP-14 Agreement a procedure that will not require VDOT to use its own funds to front end capital costs that will later be reimbursed by federal funds.

As explained in more detail in our response to Question D.3, STAR Solutions' plan of finance is staged to correspond to completion of each of the four proposed phases for constructing dedicated truck lanes through the entire I-81 corridor. The full \$1.6 billion in proposed federal earmarks are not required to complete the first phase of the project and to fund the other work projected to be undertaken elsewhere in the corridor through 2009. STAR Solutions anticipates that sufficient earmarks will be authorized to assist in funding the projected costs through this initial six-year period from 2004 through 2009. Additional federal earmarks are anticipated to complete subsequent phases of the project.

STAR Solutions' contingency plans if all or a portion of the federal funds are not received include: (a) reducing the scope of one or more phases, (b) extending the construction period of the phases, (c) seeking additional Commonwealth resources and (d) obtaining additional funding by tolling other vehicles in addition to Heavy Commercial Vehicles, if authorized by State law.

6. Describe proposed federal pilot program funding, including reimbursement provisions and any possible impacts on any other federal transportation funding that may come to Virginia. Include contingency plans for compensating for any modifications to your plan of finance in the event that any or all of the \$1.6 billion in federal earmarks is not available for this project. Include an explanation of and the timing of any necessary legislative strategies that may be required to accommodate this contingency plan.

The final determination about which of these contingency plans is used will not be made until the federal transportation bill is reauthorized next year. The current expectation is that the bill will be completed by February 29, 2004. This is only two weeks before the end of the 2004 General Assembly session, thus affording very little opportunity for debate of a change in state law to allow tolls on all vehicles. Further, the scope and cost of the project is likely to be impacted significantly by the results of the NEPA analysis that will soon be initiated by VDOT. Therefore, the STAR Solutions team does not intend to seek a change in state law to allow tolls on all vehicles during the 2004 General Assembly session. If Congress does not authorize sufficient funds that could be used for car and truck separation on I-81, then we would intend to work with VDOT during the following 10 months to examine the scope of the project to complement the results of the NEPA analysis to determine a new project cost figure. If the revenues that are anticipated to be derived from truck tolls and from the Commonwealth are, at that time, insufficient to cover the project costs for the revised project scope, then we would go to the General Assembly in 2005 to ask for the ability to toll all vehicles.

As discussed in Questions D.3 and E.3, STAR Solutions' financing plan includes the flexibility to allow adjustments and changes in the financing plan during the implementation of our I-81 project. These adjustments could involve all or some of the above actions. Although a combination of the four contingency actions most likely would be pursued, it may be helpful to explain the fourth contingency action in more detail.

The tolling configuration that we have proposed for Heavy Commercial Vehicles would enable either (1) open-tolling of other vehicles on the general purpose lanes or (2) the more typical and reliable transponder-based toll collection system. This flexibility exists because electronic tolling equipment will already be installed on all ramps so as to register tolls on all Heavy Commercial Vehicles that are entering or exiting general purpose lanes at each interchange. Perhaps a more likely toll configuration, as STAR Solutions discussed in our January 2003 Conceptual Proposal, would be to construct a limited number of toll plazas (for example, six plazas approximately 50 miles apart) in non-urban areas. Light commercial and passenger vehicles passing through these plazas would primarily represent long-distance traffic. Drivers on the I-81 general purpose lanes in urban areas would not pass through these plazas and would not pay any tolls for their local, commuting or local business use of I-81.

The projected moderate toll rates included in the Alternative Tolling Concept described in our January 2003 Conceptual Proposal would provide a substantial amount of additional funding resources for our I-81 Project. Such resources, in conjunction with the three other contingency actions, would allow funding of our complete I-81 project even if all or a portion of the proposed \$1.6 billion in federal earmarks were not received. Further, such additional resources would allow the projected toll rate on Heavy Commercial Vehicles to be reduced from the level included in our Detailed Proposal.



E. Finance/Administration

7. Describe the approximately \$98 million in state and federal funds that you assume in your proposal.

The projects comprising the \$98 million request from VDOT for improvements to I-81 are set forth in Figure 8. These projects are contained in the most recent (2004-2009) Six-Year Improvement Program and do not include the funds that VDOT has allocated for the I-81 NEPA process. The total allocations for these projects over the six-year period amount to \$113,982,000. Since actual expenditure data were not available from VDOT for the Detailed Proposal, STAR Solutions estimated that 14 percent of the allocated funds had been expended, resulting in \$98 million. The estimated expenditures were based on the actual rate of expenditure furnished by VDOT for the I-81 projects listed in our Conceptual Proposal. Changes in funding and schedules for these projects may have changed since the Six-Year Improvement Program was adopted in June 2003.

**Figure 8: I-81 Projects Identified by STAR Solutions for Available Funding
VDOT FY 2004–FY 2009 Six-Year Improvement Program**

UPC	DESCRIPTION	ROUTE	DISTRICT	ROAD SYSTEM	PLAN TOTAL
17745	Interchange Improvements at Abington	0081	Bristol	Interstate	\$ 28,048,000
4462	Replace Existing Buildings & Expand Parking	0081	Salem	Interstate	\$ 690,000
16591	Widen from 4 to 8 Lanes	0081	Salem	Interstate	\$ 4,389,000
16593	Widen from 4 to 8 Lanes	0081	Salem	Interstate	\$ 6,171,000
53094	Widen from 4 to 8 Lanes	0081	Salem	Interstate	\$ 5,590,000
53095	Widen from 4 to 8 Lanes	0081	Salem	Interstate	\$ 5,570,000
53096	Widen from 4 to 8 Lanes	0081	Salem	Interstate	\$ 6,613,000
63705	At Rte 177 (I-81 Safety Improvement)	0081	Salem	Interstate	\$ 1,459,000
63706	At Exit 137 Wildwood Rd. (I-81 Safety Improvement)	0081	Salem	Interstate	\$ 3,510,000
63707	At Rte 419 (I-81 Safety Improvement)	0081	Salem	Interstate	\$ 2,026,000



7. Describe the approximately \$98 million in state and federal funds that you assume in your proposal.

T 1141	Bridge & Pavement Modifications	0081	Staunton	Interstate	\$	927,000
18890	Bridge & Approaches North & Southbound	0081	Staunton	Interstate	\$	22,945,000
53672	Extend Box Culvert	0081	Staunton	Interstate	\$	1,456,000
53682	Bridge Widening (4-Lane) & Replacement	0081	Staunton	Interstate	\$	10,397,000
53688	Widening Bridges & Extend Accel/Decel Lanes	0081	Staunton	Interstate	\$	13,791,000
67915	Interchange Safety Improvements	0081	Staunton	Interstate	\$	400,000
TOTAL						\$ 113,982,000

Estimated Expenditures @ 14% \$ 15,957,480

TOTAL ESTIMATED FUNDS AVAILABLE IN CURRENT PROGRAM \$ 98,024,520

By incorporating these funds into our financing plan, we are not saying that these individual projects lack merit. Instead, we believe that the projects should still be built but they may need to be modified to complement our design. We think it is important, as part of a public-private partnership, that the Commonwealth participates even in a limited way in the funding of the project.